Town of Hampden
Economic Development

MEMORANDUM

To: Town Council

From: Amy Ryder, Economic Development Director

Date: January 7, 2021

RE: Axiom Broadband

In 2018 we entered in to Phase I with Axiom internet provider to supply the entire town of Hampden with faster, more reliable internet through a fiber optic system. After reviewing and discussing with council in September 2020, it was encouraged to move forward with the project considering the environment we are all in (COVID/remote learning and work) to better serve current and future residents of Hampden.

We have now entered in to Phase II, the planning phase, have been rewarded $5000.00 in grant funding from the ConnectME authority to continue to Phase II to assist in community involvement and education. The support from the community thus far has been outstanding and expected to continue to grow.

Attached you will review a report from Axiom that describes the work we have done up to this point, a review of the system, and our options of serving the entire town or just the underserved residents.

Both infrastructure options would have to go to bond. Just bonding the underserved areas in town, will cause those areas to be fully served, and in a few short years' time, what we are calling 'served' now, will be underserved. Reason being DSL/Cable/TV internet provider type internet is dying and a thing of the past. Fiber is the future (educational information about this in packet) and would eventually need to be built town wide. This seems reason enough to build out fiber town wide.

The municipal owned partnership could create revenue for the town and is a cheaper price tag upfront for the infrastructure phase.

It would be my desire to have the full support of residents to vote for the bond, and then use the Solar Lease revenues to pay bond fees to avoid increasing the mill rate for our residents. The lease payments would cover year one, fall slightly short ($5000) years 2-9, then completely cover the remaining bond term payments, still leaving a surplus after 12.

I look forward to discussing more in detail and hearing your thoughts.

Thank you,

Amy Ryder

Hampden Internet Planning Report

January 2021

By

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Axiom
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Report Overview

This report builds on the initial work that was completed some years ago to address broadband needs in the community. Over the time from our first report till now, new leadership in the community, the onset of a global pandemic and an increased focus on internet use during these difficult times has highlighted the urgency and need for better broadband across the whole community and particularly in areas of town that are not served by Spectrum, the cable TV provider that serves a portion of Hampden.

The climate for implementing high speed broadband has never been more favorable than it is today. The COVID-19 pandemic has made broadband disparities across Maine, indeed across the United States, far more apparent, and both state and federal opportunities have increased as a result. Using the information compiled in this report, Axiom and the Town intend to work closely together to generate consensus to implement a world-class Fiber-to-the-Premise (FTTP) solution for the community.

Benefits of Fiber

There is no question that fiber optic connections can bring tangible benefits to Hampden. With COVID-19, even those that might have been previously skeptical about the need for broadband now know of the importance of a speedy, reliable connection for working or schooling from home. Demands on the current technology being utilized by Spectrum and Consolidated Communications are finding their limitations as consumer demand increases.

Whichever broadband infrastructure model the community chooses to pursue, Axiom's strong recommendation is a Fiber Optic internet system which is-

- A generational investment that will last 30 years or more
- Scalable and able to meet increasing demand
- The most reliable technology on the market today- it just works

Incumbents

The two major current providers of internet service in Hampden are Spectrum and Consolidated Communications. The Broadband Committee is not particularly favorable toward Consolidated expanding their current service given the feedback from subscribers. However, given the footprint of Spectrum, the committee remains open to an expansion plan by Spectrum, even though they would expand using their current copper-based technology, not fiber optics, and that typically expansions by Spectrum do not include every address, but only those most profitable.

Because both Spectrum and Consolidated are very unlikely to meet the goals of the Town- will likely not use the latest technology; will not cover every address with the same ubiquitous service; or give the Town greater leverage over the new infrastructure, the Town is working closely with Axiom to build a new system in collaboration with the Town.

Both of the incumbent providers would bring significant compromises that the town would have to make. First, it is unlikely that the town be able to own the system with either provider. Second, the town would be acknowledging the status quo. Either Spectrum or

Consolidated bring very different views to a partnership that are likely not as compatible to bringing a FTTP solution that is controlled by the Town.

New Provider- Axiom

There is a concern that the incumbent providers service has not been as robust as needed or wanted- in fact a large area within the town does not meet and is substantially below the state and federal standard (25/3Mbps) that would constitute a reasonable and reliable service. Outreach to the community over the next several months will help advance the strategic path forward for the Town staff to bring final recommendations. Already, the Town has collected petitions from close to 200 residents who are open and interested in a new Broadband service. This effort will continue to build support for a new system that will be much more robust, reliable and futureproof.

In this new model being discussed:

- Municipal ownership model- where Hampden would own the fiber infrastructure
- Axiom would operate the new system- and provide a % of gross revenue back to the Town
- Axiom would meet the Town's goals and objectives
    - Most reliable and futureproof service- likely for 30 years or more
    - A true partnership that gives the Town control though a Partnership Agreement with Axiom
    - Equal Access to All- same outstanding service to every home and business in the community

Ownership Models

There is an increasingly large number of ownership models in Maine for the Broadband Committee to draw inspiration. Owning your own system does have benefits, most importantly having the ability to contract with the ISP of your choosing and having the ability to change ISP's if they are not performing to your satisfaction. Determining if the Town is going to work with the incumbent providers or consider a new provider will clarify ownership options.

Generally speaking, there are four ownership models for the community to consider:

1. Owned and Operated by the community
2. Owned by the Town (either in part of fully), operated by Internet Service Provider
3. Owned by investors, operated by ISP
4. Forming a public utility

The easiest of these options is #2, where the Town owns the infrastructure and Axiom operates it on behalf of the town. This is the option most likely for Hampden and Axiom to come to agreement over. That Partnership Agreement is something that the Town and Axiom will work over the next few months to finalize.

Cost

No provider will build out a system using their capital, the Return on that Investment (ROI) would take too long. This is why even the current providers have not expanded (Spectrum) or

improved (Consolidated) service in Hampden. Internet Service Providers will only take communities seriously if the town is willing to explore public funding options. This report details two options to bring new service to Hampden:

Cost Estimate for underserved or unserved areas	**$1,428,353**

And to build out service to every home in Hampden including the areas that currently have Spectrum service:

Total Cost Estimate for all of Hampden (including underserved and unserved areas)	**$4,568,022**

Grants

One of the reasons the Town is working closely with Axiom is our successful track record in attracting grant assistance to help communities defray the cost of construction. Axiom has been a partner with several communities where the whole cost or a substantial portion of the cost were obtained through federal or state grants. There are a variety of federal and state grant opportunities for the Town to consider, but with a new state grant assistance program in development, this state program is likely the best chance to obtain funding. These state funds- or any other state or federal funds- will not be eligible in any Spectrum served areas. However, given that a large area of Hampden is poorly served and not served by Spectrum, identifying and pricing those areas may create an opportunity to apply for the new state funding which we believe would be the most likely opportunity for success.

Recommendations

While these recommendations may evolve over the next few months as the Town engages citizens, these are based on current discussions and understanding of what Hampden is hoping to achieve. Based on research the Town has conducted over the past few months, and the information provided in this report, these are the recommendations:

Decisions	Recommendation
Technology choice	Fiber optic technology rather than copper-based technology currently provided by Consolidated and Spectrum
Working with Incumbents	More information may be needed, but strongly lean toward a public option with Axiom- new ISP (Internet Service Provider)
Choosing an ISP willing to support a FTTP network	Yes, especially if the fiber network is owned by the Town
Ownership model	If not working with an incumbent provider, explore various models for what fits best
Should community own system	Yes, this is a good option, saves money, town retains control over the long run
Cost	Will require capital from town- one possibility is municipal bonds which are at historically low rates
Grants	Potentially eligible for non-Spectrum areas, a state grant through ConnectMaine Authority

Why Fiber?

Fiber optic internet systems are built for the future. Broadband Committees are often asked about the differences between the available network technologies and the reasons why one is more desirable than another. The following section will help community members understand the benefits of fiber optics and its superiority over other technologies, including DSL and co-ax cable, the two technologies currently in use to provide internet service in Hampden.

- Fiber is a long-term investment in a community's future
- Fiber supports 21st century economic opportunities
- Fiber leapfrogs communities that are left behind to the front of the pack
- Fiber, over the long run, is a less expensive technology

One of the major concerns with fiber systems is the up-front cost. However, over time, other technologies will need to be replaced, upgraded or will be deemed obsolete. On the other hand, fiber will allow you to scale the bandwidth delivered as needed, while using the same fiber distribution network over a period of decades.

The optical fiber cable in the foreground has the equivalent capacity of the copper cable in the background.

Just one visual example will underscore the capabilities of a fiber connection verses a legacy copper network connection. With today's technology, one fiber the thickness of a human hair can carry more data that 4,000 top-speed DSL lines.

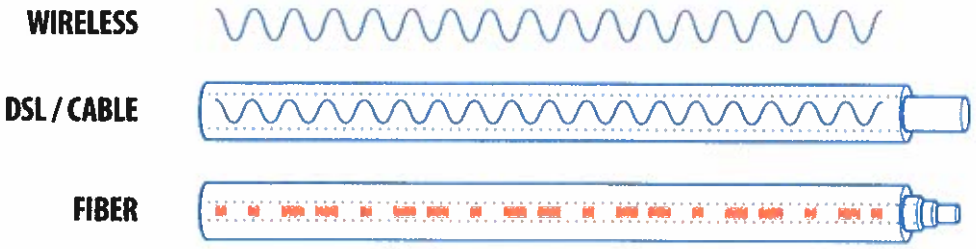
Homes that are being served by copper, either through DSL from the phone company, or with co-ax from the cable company have significant limitations in service because of how each technology works. In the case of DSL, not only is the driving technology outdated, but the old copper lines are susceptible to corrosion that can severely impact the reliability of a subscriber connection.

Furthermore, DSL is significantly limited in the distance it can push a signal (3-mile maximum), meaning those homes furthest from the telco equipment are faced with connections that often cannot reach even a paltry 3Mbps of download speed. (explanation: Mbps stands for 'megabits per second'- bits are tiny units of data, with a megabit representing a million of them. The higher the number of Mbps you have, the speedier your online activity should be)

In the case of coaxial cable (co-ax), used by TV cable providers, capacity is still an issue, but for different reasons than with DSL. Compared to a fiber-optic system, cable is not nearly so scalable – for every step up in speeds, equipment needs to be upgraded both at the home and at the cable plant. Furthermore, cable systems were designed primarily to push data down to the customer, an appreciably different model than the emerging needs for telecommuting and interactive video, which require high bandwidth in both directions. Finally, there is a major concern with the fact that cable is a shared system, meaning that the signal strength you receive is dependent on how much bandwidth is being drawn by other

users that are also connected to that line of cable. Cable companies commonly oversaturate their subscriber networks by a ratio of up to 100:1, leading to inconsistent speeds for the end user.

How it works is the secret to higher speeds



"Broadband" describes the fastest method of delivering high-speed internet to subscribers. While DSL and cable utilize existing phone and TV infrastructure to transmit data as frequency "vibrations" over copper wires, fiber networks transmit data using light over specialized cables that contain glass fiber strands. Light moves at 186,000 miles per second, and this is what enables speeds of 1 Gig (1000Mpbs) or much more per connection- 100 times faster than a 10Mbps DSL connection and 10 times faster than a 100Mbps cable connection. In addition, both DSL and cable suffer from the limits of their own technology, making them less than ideal choices into the future.

Wireless is an interesting choice and is certainly being considered in major urban markets where the density of buildings makes fiber optic cabling expensive and complicated. Wireless service, while reliable, is not as reliable as fiber optics and can be susceptible to weather conditions and movement of outdoor equipment due to wind. Wireless also requires a direct line-of-sight; obstructions are not a friend of a wireless signal. While it has the capability to be as fast as fiber, reliability concerns and reliance of line-of-sight make wireless installations best suited to very dense urban, or certain rural situations where the physical environment allows for reliable, high speed wireless systems and where costs make wireless a consideration.

Will Fiber Become Obsolete Like other Technologies?

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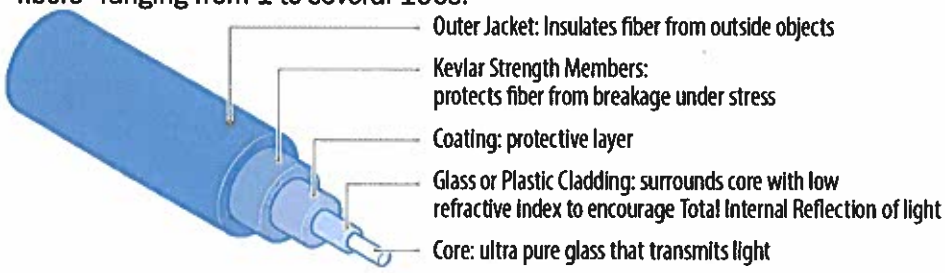
While we cannot predict the future, all indications are that fiber optics is here to stay for a very long time. Frankly, this technology has already been used for many, many years, which means that there are trillions of dollars of fiber installed globally. A whole industry has grown up around how to utilize fiber to its fullest capacity to make all of our lives better. This industry has proven very good at developing new electronics to push more and more data through existing fiber lines.

Most people think of fiber as a new technology, but in reality, it has been used for "backbone" connectivity as far back as the 80s, with hundreds of fiber optic cables running across the sea floor all around the world.

What is new, is that fiber is starting to be used to serve homes in places like Austin and Chattanooga and right here in Maine on the islands of Islesboro, Cranberry Isles and Cliff Island, where FTTH (Fiber-to-the Home) networks are deployed. Because of the extensive network of fiber already installed and continuing to be deployed, it is very unlikely that we would see any major shift in market forces that would make fiber optics obsolete.

What is in a fiber-optic cable?

An individual optical fiber (the size of a human hair) is surrounded by several layers of material that strengthen and protect the fiber. A fiber-optic cable can have any number of "fibers" ranging from 1 to several 100s.



Consumer Benefits

Speed and Capacity. Many experts say that FTTH connections are the only technology with enough bandwidth to support the projected consumer demands over the next decade.

Future proof. Because of fiber's capabilities, new technological innovations are being invented every day to utilize fiber's superior ability to transport tremendous amounts of data at blazingly fast speeds. Technologies such as 3D holographic high-definition television and gaming will someday be everyday items in households around the world. FTTH will be able handle the estimated 30 gigabit-per-second needs of such equipment... and this is just one technology. Think about the new ways that you use the internet that seem commonplace now that were not even conceived of 10 years ago.

One delivery system. Right now, a consumer can receive telephone, video, audio, television and almost any type of data transmission using a single seamless FTTH connection. That trend will continue as consumers are given increasing array of a la carte choices for how they receive their various communication and data and streaming choices. Subscribers are also realizing that receiving bundled services through a fiber connection can save money.
Reliability. Fiber is the most reliable connection you can have. In surveys across the state of Maine, the #1 complaint about their internet service is reliability. An internet connection is

becoming a necessity, not a luxury. When connectivity is interrupted or slowed down unexpectedly or inexplicably consumers are furious that they cannot accomplish the on-line task, leading to a significant loss of productivity or time- Fiber's reliability is far superior to all other technologies.

Community Benefits

Job Creation. There are many examples of fiber networks creating jobs by either supporting existing businesses or attracting new ones

Business Attraction. When we say business attraction, we really mean businesses that are looking for the kinds of connections that can move large amounts of data, quickly- architects, designers, banks and other heavy users

Entrepreneurship. Fiber helps induce young people to locate and work from anywhere

Telemedicine. The medical field and how patients and providers interact is undergoing seismic changes. One of those changes is the way patients are able to be seen, treated, monitored and are increasingly being given tools to manage their own health care, right from their home. A fiber connection has the capacity to manage these data transmission uses, which in turn facilitates our elders aging in place

Telecommuting. As remote work has changed from a luxury to a necessity, having a consistent and strong connection- especially on the upload from the home back to the internet- is crucial. The technology of fiber makes it perfectly suited to telecommuting (virtual meetings, cloud sharing documents, scheduling and a host of other applications made seamless with a fiber connection

Education. Creating equal access for all eliminates "the homework gap" for those students that are increasingly required to complete assignments on-line but are unable to do so from their home because of a lack of an adequate internet connection. Adult learners also benefit from on-line learning options that utilize interactive video or other tools that those with better connections can access

Increased Home Values. A Broadband Communities study indicated that FTTH networks increase the value of a $300,000 home by an average of $5,000-$6,000. Another study by the FTTH Council in conjunction with the University of Colorado showed that homes with a FTTH connection are worth, on average, 3.1% more than homes that do not have a fiber connection.

Summary

- Fiber is the only technology that has unlimited capacity, making it a futureproof investment
- 5G and low-orbit satellite are years away and will not meet the same reliability and capacity that fiber currently has
- Fiber is the affordable choice

Working with incumbent providers

Town officials, through conversations with community members and the responses received to their recent survey, has learned that many parts of this community have experienced challenges with the current service (or lack of) provided by both incumbent providers, Spectrum and Consolidated. In the case of areas not served by Spectrum, these community members were the loudest in demanding a new service be provided. The prospect of a long-term commitment with a private company using a significant amount of public dollars to expand their existing privately owned service may not be seen as being in the best interest of the Town. This has pushed Town staff to strongly consider creating a relationship with Axiom, a new provider that could deliver more favorable terms, better meet the needs of the community, and allow the Town to own the network. This model is a pathway for the members of a community to have a stronger voice in the network management and the delivery of internet service in Hampden.

As the plan is formed, the Town plans on doing significant outreach to obtain more community input and answer questions about the current internet service and why a new service is needed to help the community remain vibrant.

Working with incumbent providers -either Spectrum or Consolidated- can be beneficial in marginally reducing some risks to the Town and may be more comfortable for some consumers who do not feel strongly about the Town owning the infrastructure, preferring instead a more traditional approach where the ISP controls all aspects of the customer experience, and is fully responsible for the expansion of service. This is what is currently the situation in the community, and many are feeling like these providers will not give the town a significant advantage as the demand on internet exponentially increases. Most importantly, neither have embraced a model whereas the municipality owns the network, nor have they given any indication to expand or enhance current service offerings. This is at the heart of Axiom's approach to give the communities in which we work a true partnership where both sides- the ISP and the Town have aligned interest in seeing that the new internet service be a success to all potential subscribers.

Benefits of Public Ownership

Public ownership models are increasing in popularity and several communities have implemented this approach because of the benefits of aligning and assuring that community goals are met by the Internet Service Provider (ISP). This model is a pathway for municipal leaders to have a stronger voice in what is happening in their community. While this model increases the responsibility of the town, it also provides a much more collaborative approach with the ISP, which in turn brings better customer experiences, as well as the ability of the town to change providers if agreements on service are not met. These changes in the relationship foster a better partnership where the ISP is much more accountable to the user experience and the community is much more committed to mutual success for both the town and the provider. Several communities have implemented this approach and there are a number of communities in the planning stage of becoming the public owner of a broadband internet system that will be implemented over the next year. Axiom is a leading proponent of this model, believing the benefits far outweigh the failed markets in which the current service operates.

Elements of a strong Partnership Agreement

Municipal responsibilities

- Own and insure the main backbone and fiber equipment
- Work closely with ISP on marketing efforts and take rates
    - Promote ISP and early commitments to the new system
- Commit to a long-term contract with the ISP to exclusively serve the community
- Develop and maintain expectations for ISP engagement and pricing for citizens

ISP responsibility

- Repair and maintain all fiber drops that serve homes and home equipment at their cost
- Employ a local representative to support timely responses to customer issues
- Coordinate all operational and managerial responsibility for the system
- Return a % of gross revenue back to the community
- Maintain proper insurance as required of an ISP

Ownership Model Pros and Cons

Private Ownership Benefits	Private Ownership Concerns
The Town would not be responsible for anything. All responsibility would be on the ISP.	It is almost a certainty that a public subsidy will be required to build out, so public money would be used to fund a system the Town would have little to no control over.
This is a model that Spectrum & Consolidated traditionally use- so if the town works with an incumbent, this is the model to expect.	While reducing risk, private ownership also cedes any leverage for pricing or customer service expectations to the provider.
Keeps the status quo.	If you like what you got now, no change.
Updated and increased coverage to underserved parts of community.	Must insist that they serve every home- they typically are not willing to do that.

In Spectrum's case- the community would retain a cable TV option.	Spectrum is expensive, and traditional cable TV is slowly dying as people buy their content through subscription streaming services accessed through their internet connection.

Public Ownership Benefits	Public Ownership Concerns
Locally owned means the Town and the community are committed to its success. This typically drives additional takers of the service.	The Town takes on additional responsibility.
The Town has control over which ISP they choose and can change ISPs; and work to create good pricing- in short, the Town will have the leverage!	With Town leadership changes over time- having consistent Town oversight of the intent and purpose of the original goals can be a challenge.
The Town can insist on fiber optics- and not worry about becoming obsolete for 20-30 even 40 years.	Fiber can be 30% more expensive than other technologies to build.
Saves money over the long run- long term investment- can avoid much of make ready cost saving 100s of $1000s during construction	The cost of the system may not be fully covered by the revenue generated by the subscribers, requiring additional support.

Recommendation

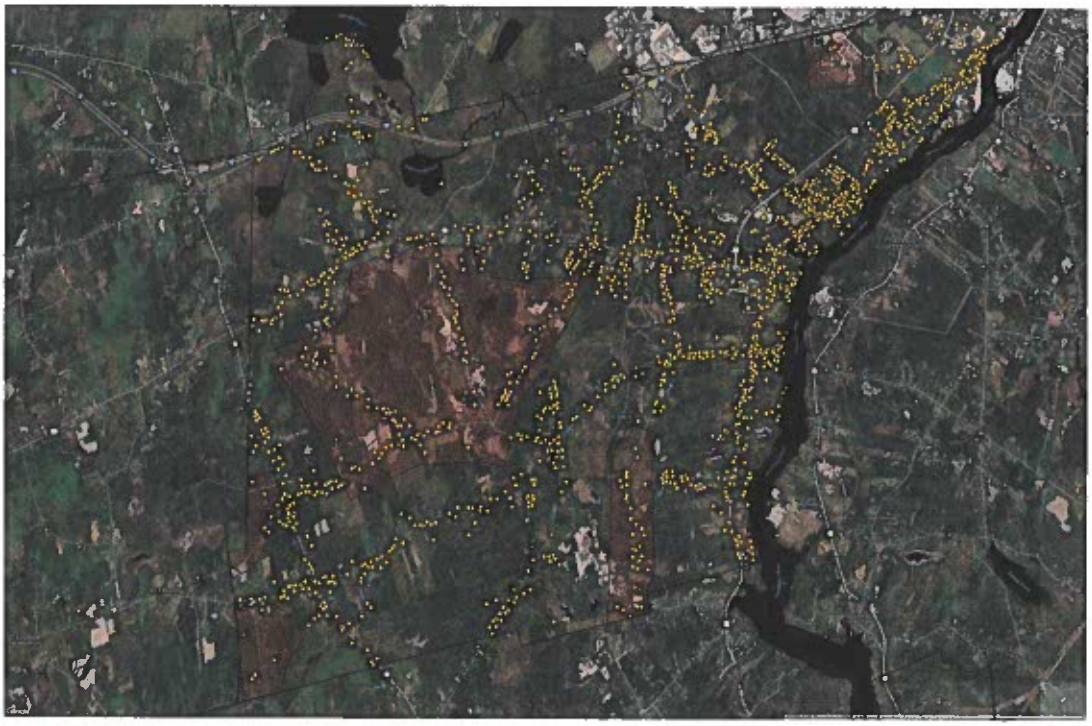
- The Town should engage the community and set a clear goal about ownership and what the community would like to achieve
  - What are the elements of an ownership agreement that need to be addressed?
  - Is there anything unique about Hampden that can be leveraged in a relationship with an ISP?
  - What are the important goals that need to be met? (e.g., Own your Own, Equal Access for All, Enhanced business service offerings, Low-income subsidy, etc.)

Construction Cost Estimates

When doing our estimates, these are intended to be high-level and significant due diligence will be required to better understand what the final cost will be. We break these numbers down for you so you can review and ask questions about the components of the construction costs.

The construction cost estimate would pay for a fiber connection at any home that wants to be connected. A calculation of expected revenues and expenses has been computed to illustrate the viability of the project, as well as the cost of servicing the bond that would fund the project, should the community decide to implement a municipal owned system. Looking at the Financial Modeling section will help the decision makers understand the commitment of the town.

We have developed two plans for this report. The first is a project that will only serve those areas not served by Spectrum currently. This is a project that we expect would be eligible for state funding to help defray the cost. The second plan is the total cost to serve the whole town, including all areas served by Spectrum. These two plans will provide a good basis of discussion on how the Town would like to proceed. In both cases, being municipally owned will save a portion of the cost to place fiber optic cabling on the utility poles.



The areas of Hamden not served by Spectrum are highlighted in red. These areas represent over 300 homes, the majority of which cannot receive adequate Broadband service, defined minimally as 25/3Mbps.
The yellow dots are home and business locations.

Project #1- Serve only areas not served by Spectrum

This partial FTTH project would serve an estimated 313 homes, and we have assumed that the location of the equipment to power this service would be at or near town land around the Hampden Municipal Office. This location can change if there is a better location.

Category	Cost	Calculations	Assumptions
Licensing Application	$50,000	This is based on the number of poles and likely very close to the cost.	
Make Ready	$330,750- only needed if the system is not municipally owned	Calc: 735 poles x $450/pole= $330,750. This is a total ESTIMATE	This number will change. It could be lower or higher.
Pole Replacement	$220,500	Calc: 10% pole replacement $3000/pole x 74poles= $220,500 this is a total ESTIMATE	Likely worst case, we sometimes calculate replacements at 5%= $110,250

Central Office (Utility Hut)	$63,000	Includes all equipment inside to light up system.	Could flux a little, but not much.
CPE/Customer Install (235 customers= 75% TAKE RATE)	$234,750	$225 for home equipment and $750 labor for install. Calc: $1000x 234 homes= $234,750	Does not include router, which we lease for $5/month or buy your own.
Construction of main system	$879,603	All in cost from contractor for main lines and drops to the home	This number is based on discussions with a construction contractor.
Flagging- Road safety crews during construction	$45,000	Total estimate	May use local public works or police to defray costs.
Project Management	$90,000	Axiom fee for overseeing construction contractor, installing CO, as well as taking orders for service	5% of overall project cost
TOTAL	$1,913,364	Includes all Make Ready	
TOTAL IF MUNICIPAL owned	**$1,428,353**	EXCLUDES make ready, reduces pole replacement and eliminates flagging	$330,000 $110,250 $45,000 Total reduction= $485,250

An explanation of categories is provided in the Appendix.

Revenue and Expense Modeling for areas unserved by Spectrum

Be aware that the Revenue and Expense modeling is just one set of assumptions based on our experience with over 25 planning processes and deployments of FTTH. Each ISP would have its own internal modeling and calculations. Depending on the contents and agreements reached in a Partnership Agreement between Axiom and Hampden, some part of the left-over revenue after expenses would be returned back to the town.

Year	Total # of Homes Served	Revenue	Expenses	Difference
#1	157	$143,261	$105,088	$38,172
#2	188	$172,417	$127,922	$44,495
#3	203	$185,015	$135,295	$49,720

#4	219	$199,773	$171,797	$27,976
#5	235	$215,371	$180,686	$34,685

Eligible for state grant from the ConnectMaine Authority

If Hampden would consider owning the system- we calculate a savings in construction cost of up to $485,250. Using the construction figure of $1,428,353- we would apply for a grant from the state. The rules for this grant program have not been finalized but are expected any day. Trying to make your community as competitive as possible, given the number of strong applications that are expected and some idea of the rules, I would suspect that you could apply for 50% of the cost of this project. There have been some discussions that the state may only require a 30% match. In any case, in the near future the details of the grant program will be known, and I would suspect that a 50% match would make your community very competitive- asking for a grant of approximately $715,000 would obviously reduce the cost to completing this part of your project significantly. On the other hand, this would still leave a burden on the town of approximately the same amount- $715,000. Some of the burden on the town could be reduced with the revenue sharing arrangement that should be included in a Partnership agreement with the ISP, making this part of the project reasonably affordable for an expected life of 30 years or more.

Project #2- Whole Community Solution

The cost estimates and revenue modeling are based on an internet system that would serve any home that wants service with the same levels of service speeds and reliability regardless of the home's physical location within the community. This would include both the Spectrum

served areas and those areas not included. In calculating the cost of the whole project, we are still estimating the possibility of a state grant to serve the eligible areas of non-Spectrum served areas.

The full-build solution would serve up to 1875 homes across all of Hampden. Again, we would place the equipment to power the system at the Hampden Municipal Office, but that could change depending on more conversations with the Town.

Category	Cost	Calculations	Assumptions
Licensing Application	$159,000	This is based on the number of poles and likely very close to the cost.	
Make Ready	$1,023,300- only needed if the system is not municipally owned	Calc: 2274 poles x $450/pole= $1,023,300. This is a total ESTIMATE	This number will change. It could be lower or higher.
Pole Replacement	$682,200	Calc: 10% pole replacement $3000/pole x 74poles= $220,500 this is a total ESTIMATE	Likely worst case, we sometimes calculate replacements at 5%= $341,100
Central Office (Utility Hut)	$298,000	Includes all equipment inside to light up system.	Could flux a little, but not much.
CPE/Customer Install (1125 customers= 60% TAKE RATE)	$843,750	$225 for home equipment and $500 labor for install. Calc: $750x 1125 homes= $234,750	Does not include router, which we lease for $5/month or buy your own.
Construction of main system	$2,801,172	All in cost from contractor for main lines and drops to the home	This number is based on discussions with a construction contractor.
Flagging- Road safety crews during construction	$90,000	Total estimate	May use local public works or police to defray costs.
Project Management	$125,000	Axiom fee for overseeing construction contractor, installing CO, as well as taking orders for service	4% of overall project cost
TOTAL	$6,022,422	Includes all Make Ready	

TOTAL IF MUNICIPAL owned	**$4,568,022**	EXCLUDES make ready, reduces pole replacement and eliminates flagging	$1,023,300 $341,100 $90,000 Total reduction= $1,454,400

An explanation of categories is provided in the Appendix.

Revenue and Expense Modeling for areas unserved by Spectrum

Be aware that the Revenue and Expense modeling is just one set of assumptions based on our experience with over 25 planning processes and deployments of FTTH. Each ISP would have its own internal modeling and calculations. Depending on the contents and agreements reached in a Partnership Agreement between Axiom and Hampden, some part of the left-over revenue after expenses would be returned back to the town.

Year	Total # of Homes Served	Revenue	Expenses	Difference
#1	938	$856,327	$611,716	$244,610
#2	1031	$940,076	$697,102	$242,973
#3	1069	$974,871	$717,491	$257,308
#4	1106	$1,008,707	$765,566	$243,140
#5	1125	$1,026,944	$776,012	$250,931

Financial calculations using a 20-year municipal bond

If the project is municipally owned and the cost of the project is 4,568,022 to bring fiber to every home in Hampden and the town is able to secure a grant for $715,000, the total cost needing to be bonded would be $3,853,022. Below are the calculated payments and the revenues retuned back to the town.

The Gap column represents the funding shortfall that would need to be made up by the Town. In effect the gap represents the shortfall in subscriber revenue needed to fully pay the bond using only those revenues derived from monthly subscribers to the service.

Maine Municipal Bond Bank
Estimate of Borrowing
Prepared via www.mmbb.com on:
January 05, 2021

Date	Principal	Rate	Interest	Total Payment	FY Total	Revenue	GAP
05/1/2022			$34,328.50	$34,328.50			
11/1/2022	$192,651.10	0.5500%	$33,328.65	$225,979.75	$260,308.25	$244,610	($15,698)
05/1/2023			$32,798.86	$32,798.86			
11/1/2023	$192,651.10	0.5800%	$32,798.86	$225,449.96	$258,248.82	$242,973	($15,275)

05/1/2024			$32,240.17	$32,240.17			
11/1/2024	$192,651.10	0.6200%	$32,240.17	$224,891.27	$257,131.44	$257,308	$177.00
05/1/2025			$31,642.95	$31,642.95			
11/1/2025	$192,651.10	0.6800%	$31,642.95	$224,294.05	$255,937.00	$243,140	($12,797)
05/1/2026			$30,987.93	$30,987.93			
11/1/2026	$192,651.10	0.7900%	$30,987.93	$223,639.03	$254,626.96	$250,931	($3,695)
05/1/2027			$30,226.96	$30,226.96			
11/1/2027	$192,651.10	0.9300%	$30,226.96	$222,878.06	$253,105.02	$250,931	($2,174)
05/1/2028			$29,331.13	$29,331.13			
11/1/2028	$192,651.10	1.0800%	$29,331.13	$221,982.23	$251,313.36	$250,931	($318)
05/1/2029			$28,290.82	$28,290.82			
11/1/2029	$192,651.10	1.2300%	$28,290.82	$220,941.92	$249,232.74	$250,931	$1,699
05/1/2030			$27,106.01	$27,106.01			
11/1/2030	$192,651.10	1.3900%	$27,106.01	$219,757.11	$246,863.12	$250,931	$4,068
05/1/2031			$25,767.09	$25,767.09			
11/1/2031	$192,651.10	1.5200%	$25,767.09	$218,418.19	$244,185.28	$250,931	$6,746
05/1/2032			$24,302.94	$24,302.94			
11/1/2032	$192,651.10	1.8780%	$24,302.94	$216,954.04	$241,256.98	$250,931	$9,675
05/1/2033			$22,493.94	$22,493.94			
11/1/2033	$192,651.10	2.1350%	$22,493.94	$215,145.04	$237,638.98	$250,931	$13,293
05/1/2034			$20,437.39	$20,437.39			
11/1/2034	$192,651.10	2.3180%	$20,437.39	$213,088.49	$233,525.88	$250,931	$17,406
05/1/2035			$18,204.57	$18,204.57			
11/1/2035	$192,651.10	2.4470%	$18,204.57	$210,855.67	$229,060.24	$250,931	$21,871
05/1/2036			$15,847.48	$15,847.48			
11/1/2036	$192,651.10	2.5680%	$15,847.48	$208,498.58	$224,346.06	$250,931	$26,585
05/1/2037			$13,373.84	$13,373.84			
11/1/2037	$192,651.10	2.6750%	$13,373.84	$206,024.94	$219,398.78	$250,931	$31,533
05/1/2038			$10,797.13	$10,797.13			
11/1/2038	$192,651.10	2.7320%	$10,797.13	$203,448.23	$214,245.36	$250,931	$36,686
05/1/2039			$8,165.52	$8,165.52			
11/1/2039	$192,651.10	2.7840%	$8,165.52	$200,816.62	$208,982.14	$250,931	$41,949
05/1/2040			$5,483.81	$5,483.81			
11/1/2040	$192,651.10	2.8310%	$5,483.81	$198,134.91	$203,618.72	$250,931	$47,313
05/1/2041			$2,756.84	$2,756.84			
11/1/2041	$192,651.10	2.8620%	$2,756.84	$195,407.94	$198,164.78	$250,931	$52,767
TOTALS	**$3,853,022.00**		**$888,167.91**	**$4,741,189.91**			

This model produces a deficit over the first 8 years of a modest $49,780. However, years 9-20 produce a surplus of $311,591, easily paying the full bond cost and leaves a surplus of $261,811.

These numbers are achieved by attaining a 60% take rate, meaning 60% of homes would take the new service by year 5. If the take rates were not achieved, the gap would be larger for longer, but this would remain a very viable project with relatively little to no cost to the Town over time.

Assumptions

- Take rates reaching 60% by year 5
- The system is municipally owned, therefore avoiding an estimated $1,000,000 in make ready
- The Town is awarded a grant for $715,000
- Town is willing to bond to get very low rates, and for 20 years (you likely could pay off in 15 years)

Grant Funding

What can communities do now to get ready and anticipate grant opportunities- and what are the grant opportunities available? This section communicates several areas of focus that communities can work on now, so they are ready when grant opportunities are available. In addition, we have compiled a list of the grant opportunities we are aware of, this list should help your community investigate potential sources of funding.

Goal: Be Ready

Funding

Because most rural communities are governed through a town meeting, typically a warrant needs to be developed and approved several months ahead of the actual meeting. For these communities, we suggest that you begin exploring the possibility of getting something on the warrant.

For those communities that have a Town Council, the funding timeline may be different, but just as importantly all Broadband Committees should educate themselves on the process at council or town meetings. Often, funding opportunities don't line up with town processes and opportunities can be missed simply because of timing.

We recommend having a community set aside a small amount of money; $5000-$20,000 have been amounts that other towns have earmarked that can be used on activities to create grant applications, install HotSpots or used as a match for a future grant opportunity. In other cases, it was just as important to get language endorsing the work of a Broadband Committee and authorizing the Committee to explore any and all funding sources or to regularly report back on findings to town officials as to progress. All positive steps that can move the process forward.

Plans

Starting early engagement with any possible Internet Service Provider is very important. Building trust, agreeing to common goals and roles and responsibilities will go a long way when opportunities arise to work together.

Goals

After looking at your town plan, you should consider and settle on your goals. "My internet stinks" is not a goal. Typically, communities that do well are able to articulate the answer to this fundamental question: Why? Why should the town focus on this? Why should we spend taxpayer dollars? Why is this important? The Broadband Committee must settle on their goals and be able to articulate those goals not only to their town leaders but to other citizens to build support. And speaking of support, I have mentioned this many times- find a champion- someone who I like to call EF Hutton- when they speak, people listen. This could be a town elected official, but many times it's someone else who has significant influence in the community. This person can be critical to the success of any project. Start now and create a narrative for when you appear before the Select Board or Council and find a champion if you don't have one yet.

Explore the Criteria of Funding Opportunities

The Committees should look at each of the potential funding sources listed below to see if the criteria can be met by the community. Whether it's a cash match, or will only serve areas

with minimal speeds, or a host of other eligibility requirements, many small communities are not used to the level of intensity required to successfully apply for a grant. Be prepared. Know what the requirements are and start to assemble the needed documentation to give your community the best chance.

Advisory resources: Beyond Axiom, Peggy Schaffer, the Director of the ConnectMaine Authority can be a good resource for communities. She is one person- be mindful of that- and can be reached at Peggy.Schaffer@maine.gov.

Island Institute is also another great resource- Kendra Jo Grindle can be a great resource. As you get closer to implementation, she should be part of Committee discussions and a supporter of your efforts. She can be reached at kgrindle@islandinstitute.org

Grant Opportunities

The ConnectMaine Authority offers two types of grants- Infrastructure and Community Broadband Planning Grants. For the purposes of this report, the planning grant is not a consideration. We would recommend looking toward an Infrastructure grant, details can be found here: http://maine.gov/connectme/grants/

Axiom has extensive knowledge of these grants and have received many of these grants totaling over $1M.

- Grant proposals must meet the state standard of 10/10Mbps
- Grant limits are suggested, but typically $100,000, which must be matched 1 to 1 with a combination of cash and in-kind services
- Area targeted must be unserved or underserved (Service that is less than 25/3Mbps)

Typically grant is open for applications in the March- April timeframe, but is not clear this year when grants may be available.

**** A $15M bond for Internet construction was passed in July. Those rules governing that grant program may be different than the ones currently used on past infrastructure grant submissions. You should follow these developments closely to understand the new requirements when they are announced ****

The Maine Community Foundation has regional grants that can support initiatives up to $10,000 a year found here: http://www.mainecf.org/GrantsNonprofits/AvailableGrantsDeadlines/CommunityBuildingGrantProgram.aspx

- Grants available up to $10,000
- Local decision makers by county
- Various criteria that need review
- Deadline February 15th of each new year

The Foundation also has grants up to $15,000 for Community Broadband related activities, the deadline just passed but details of requirements can be found here: https://www.mainecf.org/apply-for-a-grant/available-grants-deadlines/community-broadband-grant-program/

- Grant Awards up to $15,000
- Typically, 10 awards every year
- Application deadline October 15th

Northern Boarder Regional Commission Grants located here: http://www.nbrc.gov/
The Commission accepts grant applications from across the northern border regions of Maine, New Hampshire, Vermont and New York.

- Requires at least a 1 to 1 cash match
- Must be tied to quantifiable job creation
- Very competitive

Contact: Andrea Smith at (207) 624-9813 or andrea.smith@maine.gov for information on deadlines and program parameters.

Grant Funding Resources- Federal

Federal Stimulus Package

- **$3.2 billion** – Affordability: emergency funds for low-income families to access broadband through an FCC fund.
  - $50 monthly emergency broadband benefit for low-income households and households where the recently unemployed reside, and $75 monthly for eligible households on Tribal lands. This benefit will be available to those households in which one member qualifies for 1) the Federal Communications Commission's Lifeline program; 2) Free and reduced-price lunch; 3) Pell grants; and 4) broadband providers' low income or COVID-19 programs.
  - In addition, households that include recently unemployed individuals will be eligible
- **$1 billion** tribal broadband fund.
- **$250 million** in FCC telehealth funding
- **$65 million** to complete the FCC broadband maps in order for the government to effectively disperse funding to the areas that need it most.
- **$2 billion** for 'rip n replace' to small telecommunication providers to rip out Huawei/ZTE equipment to replace it with secure equipment
- **$300 million** grant program to fund broadband in rural areas (getting more details)

U.S. Department of Agriculture (USDA) has several potential programs that would fund Broadband expansion opportunities. The most important of these is the **Reconnect Program** which is now in its second round of funding. Details of the program can be found here: https://www.usda.gov/reconnect/program-overview

We are anticipating a third round of $550M available to be divided in three categories- 100% grant, 50/50 grant-loans and 100% loans. Each of these categories have slightly different criteria. This year Axiom was a significant contributor to two pending Reconnect applications.

- Extremely difficult to apply for with lots of different document and eligibility requirements
- Most importantly, only 10% of homes in the proposed service area can have the capability of getting service of 10/1Mbps or higher

- Even in the 100% grant, the municipality or applicant is required to have a 25% cash match

After looking through the program overview and other details, please contact Mark Ouellette, the author of this report, as he is familiar with this opportunity and can try to answer questions- mark@connectwithaxiom.com. Also available is the USDA Regional staff, Tim Brooks- timothy.brooks@usda.gov.

USDA-RUS Programs offer a number of other potential opportunities to investigate located here: https://www.rd.usda.gov/programs-services/all-programs/telecom-programs. By far the easiest is the Distance Learning and Telemedicine Grants.

U.S. Department of Commerce- **Economic Development Administration (EDA)** provides funding for economic development projects across the state of Maine. Maine projects are reviewed and administered by EDA's local representative, Alan Brigham at (215) 316-2965 or abrigham@eda.gov. Programs and eligibility can be found at www.eda.gov.

- Various funding programs
- Guidelines encourage regions to incorporate BB investments in their regional strategies (CEDS)
- Funding requires match

U.S. Department of Commerce- **Broadband USA** is helping communities nationwide ensure they have the broadband infrastructure, digitally literate workforce and engaged citizens to thrive in the Digital Economy. Details can be found here: https://www2.ntia.doc.gov/

- Provides direct (one-to-one) assistance to communities
- Resource rich website- no direct grants
- Building a self-assessment tool for community

Suggested Action Items

- Grant funding
  - Must determine if Town is ready for first round of grant funding
  - Expected to open up as early as January 2021

- Build Community Support
  - Create a series of outreach opportunities for citizens to participate or provide feedback
    - Continue surveys
    - Is this a priority over other Town issues?
  - Presentation to Town Council

- Expand Broadband Committee
  - Add key constituencies
    - School representative
    - Key Businessperson
    - Residents from various areas of town
  - Develop messaging about report and next steps

- Answer key questions
  - Do we want the new system to be municipally owned?
  - Can we settle on the ISP?
    - Work on elements of Partnership Agreement
    - Work with Axiom to help us be ready for grant opportunities

QUESTIONS ABOUT THE REPORT?

Mark Ouellette, President & CEO of Axiom Technologies- a full-service internet service provider and professional services company based in Machias. Please contact him on his mobile phone at (207)272-5617 or via email at mark@connectwithaxiom.com.

Appendix

Definitions

Licensing Application, Make Ready and Pole Replacement
All three of these categories relate to the process of applying for and receiving the approval to run fiber on the utility poles. The application cost cannot likely be avoided, even if you proceed as a municipally owned system. The cost of Make Ready can be avoided, if you are municipally owned and it's unclear if you could avoid all or some of the expected pole replacements that may be necessary to run a new fiber cable.

Central Office
A CO refers to the location where the central operating equipment would be housed, for simplicity sake we propose a new telco hut with heating and cooling, as well as a generator to power the system in the event of lost power.

Customer Premise Equipment (CPE)
We have calculated a 60% take rate as to the number of units needed. It's possible that the Town would only purchase the number of units for people that sign up in the construction period. This may reduce the cost marginally but would increase the burden for those that sign up later.

Construction Cost
Obviously, the largest expense, this number will need to be tested once we are ready and the project is approved and moving forward. There have been increased costs to fiber materials as demand has skyrocketed, and the timing of the build may also affect price. Larger demand on construction crews, building in off-construction season can contribute to final pricing. It will not be clear until the Town gets closer to hiring a contractor. We feel good about this number, but want to be super clear, nothing is set in stone until a contract is agreed to and signed.

Flagging (road safety crews during construction)
We anticipate some need for flaggers to provide safety to the constructors and the public. How much will be needed and how much that cost will be is dependent on a number of factors. Some of these costs might be avoided with the use of local crews or police.

Project Management
There is an enormous amount of oversight, questions and inquiries about these kinds of projects. If anyone has ever built a home, you understand the long list of decisions that need to be made- it's analogous to a fiber build project. Overseeing all of the decisions during construction, ensuring that the goals of the community are met, and gathering all of the detailed necessary information from all of the potential subscribers requires a significant effort.